

# MODELING THE COST OF LOCAL TELEPHONE SERVICE

by

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to

The Economic Staff of  
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## OUTLINE

- TS-LRIC Approach
- Network Modeling
- Expense Modeling
- Example of Cost Results
- Summary

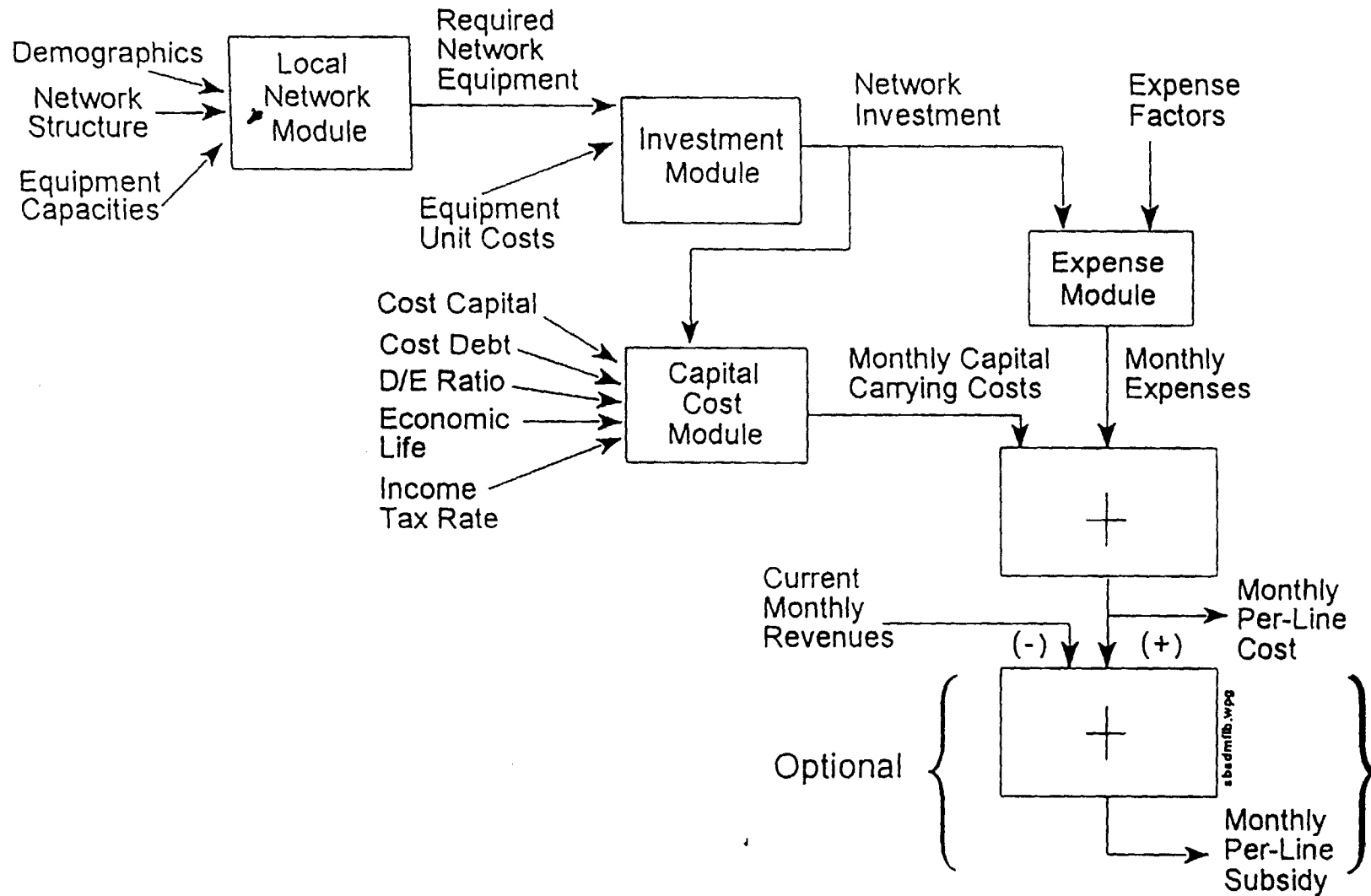
## TS-LRIC APPROACH

- The TS-LRIC of local telephone service is defined as the total additional cost incurred by a telephone company from offering the entire service, using best available technology
- Using embedded costs would result in subsidizing existing inefficiencies and overvalued plant
- Using LRIC would underestimate the cost of providing service

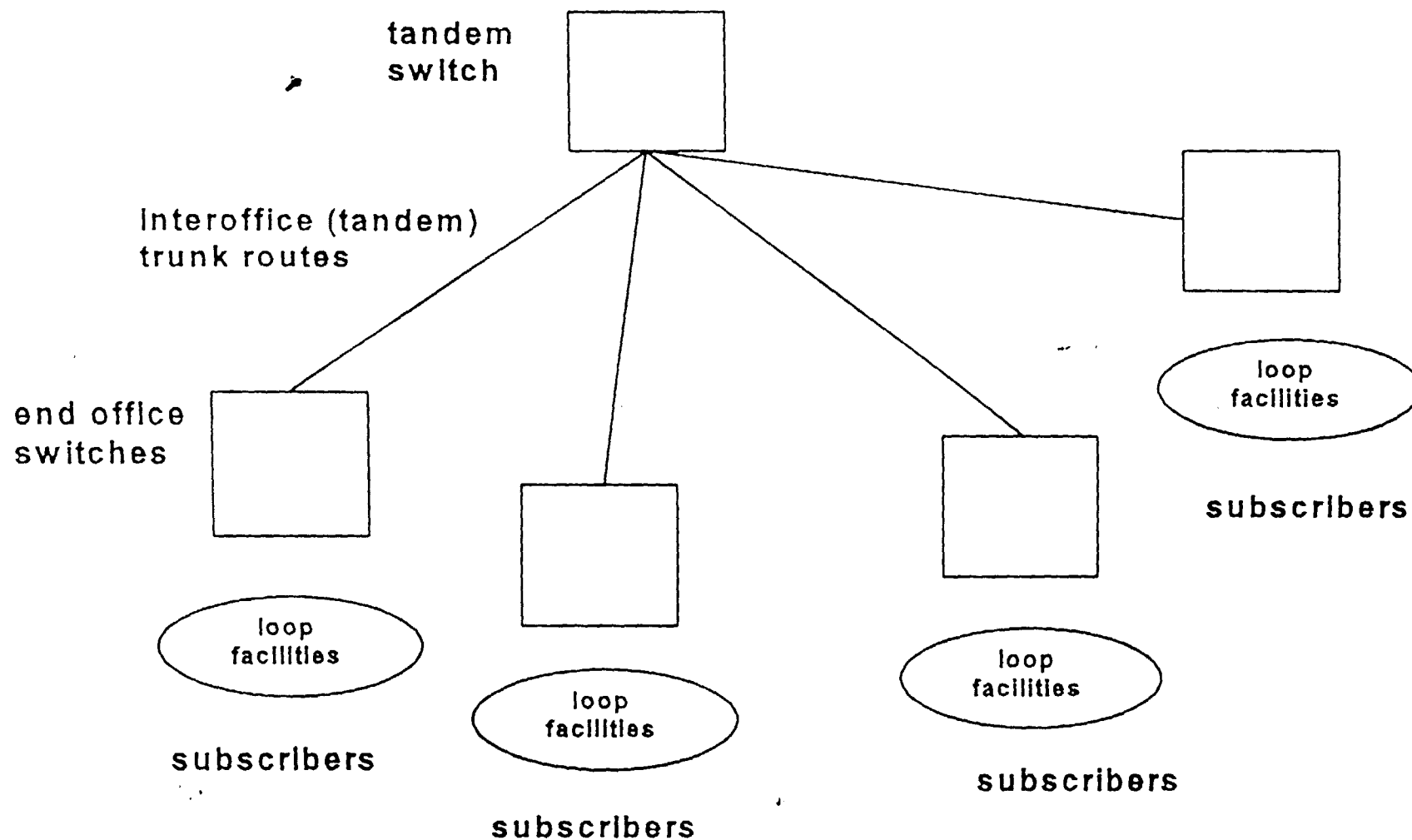
## APPLICATIONS OF TS-LRIC APPROACH

- Estimating cost of Basic Universal Service
  - Single-line, single-party residential network access
  - Local usage
  - Touch-tone capability
  - White pages directory listing
  - Access to 911 services, operator services, Directory Assistance, TRS
- Analyzing tariff filings related to local service
- Embodied in
  - Hatfield Model - Hatfield Associates, Inc.
  - Benchmark Cost Model - MCI, Sprint, US West, NYNEX, which has been incorporated into Hatfield Model

# HATFIELD MODEL PROCESS

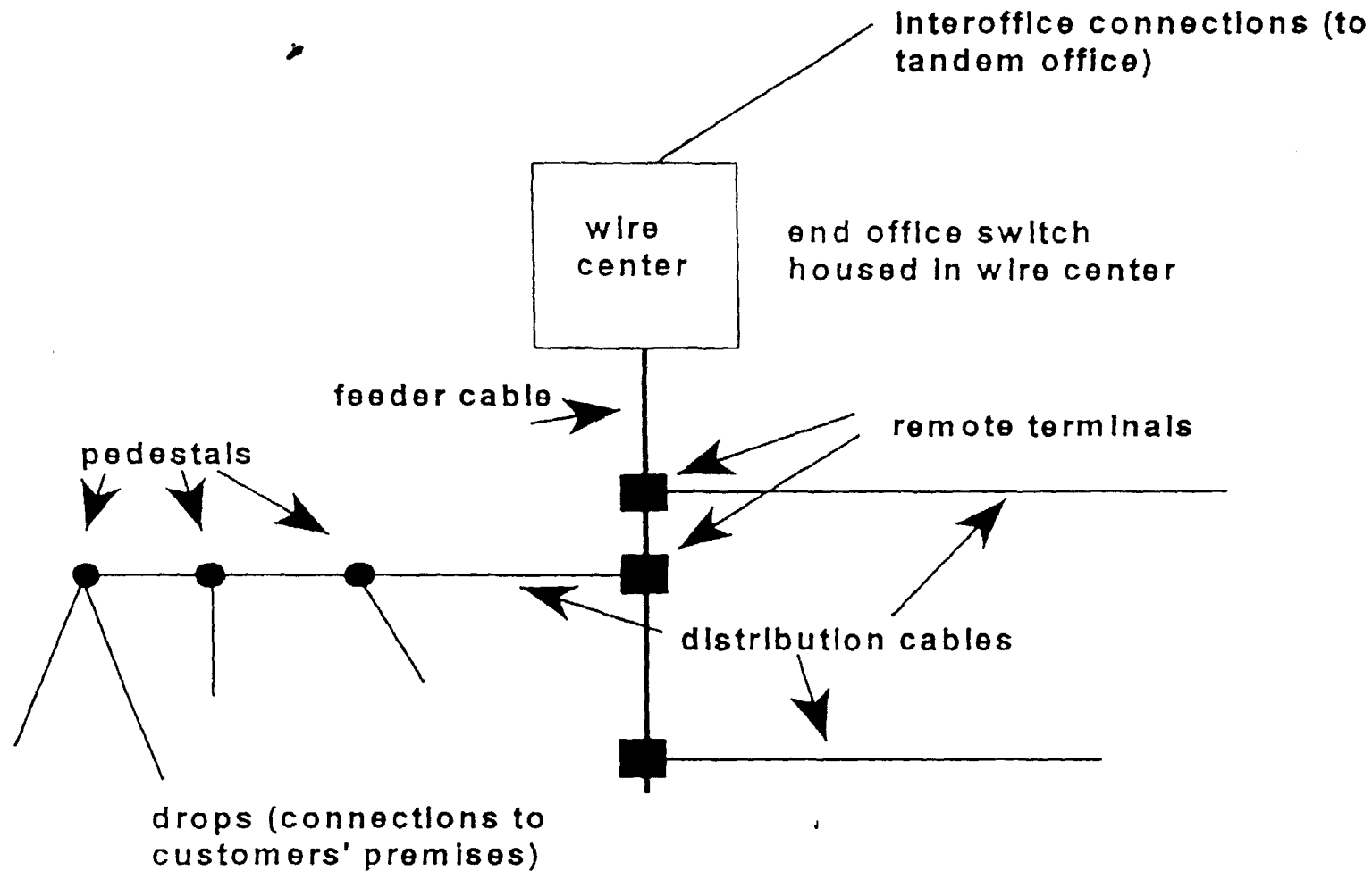


# NETWORK MODELING



## NETWORK MODELING (CONT'D)

### Benchmark Cost Model



## NETWORK MODELING (CONT'D)

### Benchmark Cost Model (Cont'd)

- Loop technologies
  - Optical feeder cables extend from wire center to remote terminal locations
  - Optical multiplexers connect with digital loop carrier remote terminals
  - Remote terminals provide interface between carrier systems and customer distribution medium
  - Analog copper distribution medium (loops) connect remote terminals to customers' premises
  - Alternative: loops in tapered cables all the way from wire center to premises



## NETWORK MODELING (CONT'D)

- Switch technologies
  - Model uses current end office and tandem switch technologies
  - Digital switching with current processor technology
  - Includes touch-tone as “default” customer signaling method
  - Switches sized for number of lines served

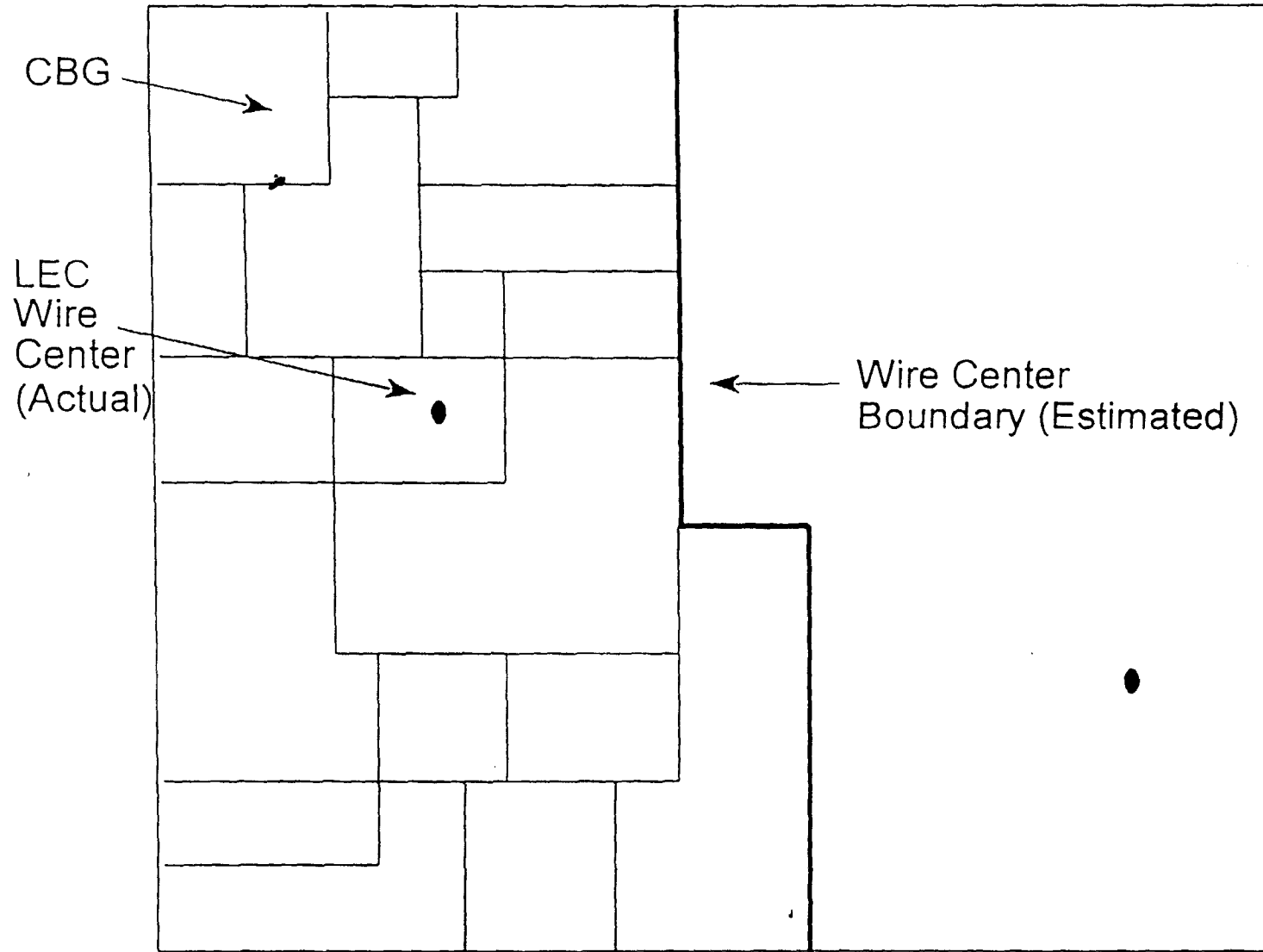
## NETWORK MODELING (CONT'D)

- Interoffice technologies
  - Model assumes optical carrier systems and tandem switching
  - Facilities sized to have sufficient capacity for customers' local usage
  - Current model only approximates this part of network; less than 3% of per-line network investment

## USE OF CENSUS BLOCK GROUP (CBG) DATA

- Database in Benchmark Cost Model
- Assigns U.S. population to existing wire centers
- Properly sizes switches, distribution network
- Allows aggregation to desired study areas
  - Wire centers
  - Political entities (cities, counties, etc.)
  - Telephone company territories
  - Population density zones

## CBG ASSIGNMENT TO WIRE CENTERS



## EXPENSE MODELING

- Investment expense
  - Cost of Equity 14.4%
  - Cost of debt 7.0%
  - Debt/equity ratio 40/60
  - Cost of Capital 11.4%
  - Income tax rate 43.0%
- Depreciation
  - Assumed 18 year average plant life
- Inputs can be varied

## EXPENSE MODELING (CONT'D)

- Operating expenses
  - Plant Specific Factors based on historical relationship between capital investment and expenses (switching exception)
  - Plant Non-Specific Factors based on historical per line expenses
  - Uncollectibles Historical Factor
  - Billing and Collection Cost Studies
  - Operating Taxes Historical Factor
  - Overhead 10 percent factor
- Forward-looking estimates would be preferred

## EXAMPLES OF COST RESULTS

- Testimony filed in Pennsylvania 12/08/95
- Analyses
  - Bell Atlantic-Pennsylvania (BA-PA) by population density zone
  - BA-PA with zero loop investment and no joint, shared, common costs
  - GTE, United
  - Philadelphia, Pittsburgh, Punxsutawney

## EDUCATIONAL ROLE OF LIBRARIES AND LIBRARY AGENCIES/NETWORKS AND TECHNOLOGICAL SUPPORT ROLE OF LIBRARY AGENCIES, COOPERATIVES, CONSORTIA, AND NETWORKS

**School/Academic Libraries.** School library media centers and libraries and learning resource centers in colleges and universities support the educational missions of their parent institutions.

**Public Libraries.** The standard manual for public library role setting<sup>1</sup> lists a standard set of eight roles useful for comparative purposes:

- Community Activities Center
- Community Information Center
- Formal Education Support Center
- Independent Learning Center
- Popular Materials Library
- Preschoolers' Door to Learning
- Reference Library
- Research Center

Each community library will emphasize roles to fit local needs, but most of the major roles listed above involve education in the broad sense, lifelong learning, literacy, and increasingly-- information and technological literacy as libraries provide public access computer terminals, Internet access, and assistance to the public in using these tools.

Further, the public values the educational roles of the public library very highly. A 1993 Gallup survey<sup>2</sup> found that the following roles were ranked very important by the highest percentages of the general public:

- Educational support center for students of all ages (88%)
- Learning Center for adult independent learners (85%)
- Discovery and learning center for preschool children (83%)

“In 1988, based upon a similar study in Florida, a study entitled ‘The Educational Role and Services of Public Libraries in **Indiana**’ documented that 90% of the libraries provided materials appropriate to the needs of preschool children and their parents; 80% supplemented formal education; 68% provided literacy materials; and 82% made GED materials available.” (4/5/96 e-mail message from Ray Ewick, Director, Indiana State Library, ewick@statelib.lib.in.us)

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<sup>1</sup>CHARLES R. MCCLURE ET AL., PUBLIC LIBRARY DEVELOPMENT PROJECT, AMERICAN LIBRARY ASS'N, PLANNING AND ROLE SETTING FOR PUBLIC LIBRARIES: A MANUAL OF OPTIONS AND PROCEDURES 28 (1987).

<sup>2</sup>GEORGE D'ELIA, THE ROLES OF THE PUBLIC LIBRARY IN SOCIETY -- THE RESULTS OF A NATIONAL SURVEY (final report 1993).



A typical public library mission statement is the following: "It is the mission of the North Suburban District Library to serve as a resource center, where popular and educational support materials in a variety of media are accessible to citizens of all ages and interests, with special emphasis on students and pre-school children." This mission will be accomplished, the library notes, in cooperation with other public bodies, community groups, agencies, and individuals. The library has a specific technology plan. The goal outlined in this plan is to "enhance user services through increased use of technology" and the first objective is to "increase users access to electronic reference information and resources." (3/29/96 e-mail message from North Suburban District Library, 6340 N. Second St., Loves Park, **Illinois** 61111)

**Library Agencies and Networks.** State Library Administrative Agencies are charged with library development throughout their state, administer federal and state support for libraries and library development, and often contract for or otherwise aggregate demand for technological and other services for libraries, especially small and rural public libraries. A variety of multitype library cooperative, consortia, and library networks have been organized by libraries themselves to share library resources and bibliographic information to better serve users. Such interlibrary cooperative arrangements have also been stimulated by the federal Library Services and Construction Act title III Interlibrary Cooperation and Resource Sharing program administered by the Department of Education, and in each state by the State Library Administrative Agency. This program requires cooperation among two or more types of libraries such as public, school, academic, and specialized libraries and stimulates technological innovation as a way of accomplishing the desired coordination across institutional, political, and geographic boundaries. These networks or other arrangements are not-for-profit, receive some public funding, and foster member libraries' roles and missions, of which education and literacy are foremost.

As an example, in **Massachusetts**, the state library administrative agency is the Board of Library Commissioners. Its strategic plan includes the following section in its vision statement: "All Massachusetts libraries -- academic, public, school, institutional and corporate -- are linked electronically through a statewide computer and telecommunications network. This network carries text, images and other media and is accessible from home or office. Through this network users can search and retrieve information from Massachusetts libraries, community resource files, local, state and federal government resources, national and international sources, and licensed commercial databases."

The Massachusetts state library agency (Board of Commissioners) recently noted the importance of library networks in aggregating demand: "Library networks, both multitype and single type (usually public libraries) are central to our program of Internet access in Massachusetts. Under the network concept, all telecommunications costs are aggregated and paid by the network (not by the individual libraries). It is critical that regulations acknowledge this role and provide an extension of eligibility and discounts to library networks on the same basis as for libraries. Our networks are incorporated as non-profits and have IRS 501(c)(3) designations. Only libraries are members." (3/29/96 e-mail message from Paul J. Kissman, Library Information Systems Specialist, Commonwealth of Massachusetts Board of Library Commissioners, pkissman@tiac.net.)

The **Nevada** State Library reports that: "All three of the public library networks are cooperative and/or multi-type networks. Two of the networks operate to serve multiple public library jurisdictions. There are also existing agreements in all the networks to serve school, school/public, and public/community college library combinations. Several Native American communities are served by the networks; however, there are others that have no connection and it's the same story - remoteness and lack of digital service. In spite of this, Nevada librarians have understood 'to cooperate is to survive'." (4/1/96 fax message from Diane Baker, Assistant State Librarian, Nevada State Library and Archives)

The following is an excerpt from the vision statement/guiding principles for the **Illinois** library network, adopted by the Illinois State Library Advisory Committee in 1994:

The Illinois State Library is committed to networking which represents good public policy in maximizing the use of the resources of all types of libraries. Every library user benefits from expanded access to information beyond the four walls of a single library building; a single library cannot meet all of the needs of its users. Networking is a cost-effective means of delivering information to citizens of Illinois by using library resources throughout the state. Technology is key to effective networking, including, but not limited to, machine-readable bibliographic records and enhanced telecommunications links among libraries. (3/29/96 e-mail message from Kathleen Bloomberg, Illinois State Library, kbloomb@library.sos.state.il.us)